

CLAIMS

WHAT IS CLAIMED:

1. A device for forming multiple holes in subchondral bone, comprising:
5 a housing;
a fracture pin having a sharpened tip, said sharpened tip adapted to penetrate
subchondral bone; and
a trigger that is adapted to, when actuated, cause said sharpened tip to move and
penetrate into said subchondral bone, thereby forming at least one of said
10 holes.

2. The device of claim 1, wherein said fracture pin is operatively coupled to said
housing.

15 3. The device of claim 1, wherein said device further comprises a biasing
member that is adapted to cause said sharpened tip to return to an initial, retracted position
after said at least one hole has been formed.

20 4. The device of claim 1, further comprising a cylinder that is actuated by
actuating said trigger.

5. The device of claim 4, further comprising:
a hammer that is pivotally coupled to a rod of said cylinder, said hammer having a
striking face; and

a striking face on an end of said fracture pin opposite said sharpened tip, wherein,
when said cylinder is actuated, said striking face of said hammer strikes said
striking face of said fracture pin, thereby causing said sharpened tip to move.

5 6. The device of claim 4, wherein said cylinder is a pneumatic cylinder.

10 7. The device of claim 6, further comprising an air block that is operatively
coupled to said pneumatic cylinder, wherein, when said trigger is actuated, said air block
allows air to flow to said pneumatic cylinder through said air block, thereby actuating said
pneumatic cylinder.

15 8. The device of claim 7, wherein said trigger is operatively coupled to said air
block by a structural bar, one end of said bar being adapted to engage a control lever on said
air block at least when said trigger is actuated.

 9. The device of claim 1, further comprising a trigger biasing spring coupled to
said trigger and said housing, said trigger biasing spring adapted to, when said trigger is
actuated, create a biasing force to return said trigger to an initial starting position.

20 10. The device of claim 4, wherein said cylinder is positioned within said housing.

 11. The device of claim 6, wherein said pneumatic cylinder and an air block that is
operatively coupled to said pneumatic cylinder are both positioned within said housing.

12. The device of claim 1, further comprising a guide tube having an angled tip, at least a portion of said fracture pin being positioned within said guide tube.

13. The device of claim 1, wherein said fracture pin is removably coupled to said housing and said fracture pin is disposable.

14. The device of claim 1, further comprising means for limiting the movement of said sharpened tip when said trigger is actuated to thereby limit a depth of said at least one hole.

15. A device for forming multiple holes in subchondral bone, comprising:
a housing;

a fracture pin having a sharpened tip, said sharpened tip adapted to penetrate subchondral bone; and

an actuatable cylinder that is adapted to, when actuated, cause said sharpened tip to move and penetrate into said subchondral bone, thereby forming at least one of said holes.

16. The device of claim 15, wherein said fracture pin is operatively coupled to said housing.

17. The device of claim 15, wherein said device further comprises a biasing member that is adapted to cause said sharpened tip to return to an initial, retracted position after said at least one hole has been formed.

18. The device of claim 15, further comprising:

a hammer that is pivotally coupled to a rod of said cylinder, said hammer having a striking face; and

a striking face on an end of said fracture pin opposite said sharpened tip, wherein, when said cylinder is actuated, said striking face of said hammer strikes said striking face of said fracture pin, thereby causing said sharpened tip to move.

19. The device of claim 15, wherein said actuatable cylinder is a pneumatic cylinder.

20. The device of claim 19, further comprising:

an air block that is operatively coupled to said pneumatic cylinder; and

a trigger that is operatively coupled to said air block, wherein, when said trigger is actuated, said air block allows air to flow to said pneumatic cylinder through said air block, thereby actuating said pneumatic cylinder.

21. The device of claim 20, wherein said trigger is operatively coupled to said air block by a structural bar, one end of said bar being adapted to engage a control lever on said air block at least when said trigger is actuated.

22. The device of claim 20, further comprising a trigger biasing spring coupled to said trigger and said housing, said trigger biasing spring adapted to, when said trigger is actuated, create a biasing force to return said trigger to an initial starting position.

23. The device of claim 18, wherein said hammer is pivotally coupled to said housing.

24. The device of claim 20, wherein said trigger is pivotally coupled to said housing.

25. The device of claim 15, wherein said cylinder is positioned within said housing.

26. The device of claim 19, wherein said pneumatic cylinder and an air block that is operatively coupled to said pneumatic cylinder are both positioned within said housing.

27. The device of claim 15, further comprising a guide tube having an angled tip, at least a portion of said fracture pin being positioned within said guide tube.

28. The device of claim 15, wherein said fracture pin is removably coupled to said housing and said fracture pin is disposable.

29. The device of claim 27, wherein said angled tip may have an angle that ranges from approximately 30-60 degrees.

30. The device of claim 27, wherein said guide tube has an outside diameter that ranges from approximately 6-8 millimeters.

31. The device of claim 15, further comprising means for limiting the movement of said sharpened tip when said cylinder is actuated to thereby limit a depth of said at least one hole.

5 32. A device for forming multiple holes in subchondral bone, comprising:
a housing;
a fracture pin having a sharpened tip, said sharpened tip adapted to penetrate
subchondral bone; and
a movable hammer that is adapted to, when actuated, cause said sharpened tip to
10 move and penetrate into said subchondral bone, thereby forming at least one
of said holes.

33. The device of claim 32, wherein said hammer is operatively coupled to a cylinder, said hammer being rotationally movable when said cylinder is actuated.

15 34. The device of claim 32, wherein said hammer is operatively coupled to a trigger, said hammer being rotatably movable when said trigger is actuated.

20 35. The device of claim 34, wherein said hammer is coupled to a biasing member, said biasing member adapted to create a bias force when said hammer is rotatably moved by actuation of said trigger.

36. The device of claim 34, wherein said device further comprises a trigger biasing member that is operatively coupled to said trigger and said housing, said trigger

biasing member being adapted to, when said trigger is actuated, create a biasing force to return said trigger to an initial position.

37. The device of claim 34, further comprising:

5 a recess formed in said hammer; and

a structural member coupled to said trigger, a portion of said structural member being positioned in said recess in said hammer.

38. The device of claim 34, wherein said structural member comprises a cross bar,

10 and said cross bar is adapted to be positioned in said recess in said hammer.

39. The device of claim 38, wherein said cross bar is sliding removable from said recess after said hammer has been rotated a sufficient distance.

15 40. The device of claim 32, wherein said fracture pin is operatively coupled to said housing.

41. The device of claim 32, wherein said device further comprises a biasing member that is adapted to cause said sharpened tip to return to an initial, retracted position
20 after said at least one hole has been formed.

42. The device of claim 33, further comprising:

a rod of said cylinder that is pivotally coupled to said hammer, said hammer having a striking face; and

a striking face on an end of said fracture pin opposite said sharpened tip, wherein,
when said cylinder is actuated, said striking face of said hammer strikes said
striking face of said fracture pin, thereby causing said sharpened tip to move.

5 43. The device of claim 33, wherein said cylinder is a pneumatic cylinder.

 44. The device of claim 43, further comprising:
an air block that is operatively coupled to said pneumatic cylinder; and
a trigger that is operatively coupled to said air block, wherein, when said trigger is
10 actuated, said air block allows air to flow to said pneumatic cylinder through
said air block, thereby actuating said pneumatic cylinder.

 45. The device of claim 32, wherein said moveable hammer is pivotally coupled
to said housing.

15 46. The device of claim 44, wherein said trigger is pivotally coupled to said
housing.

 47. The device of claim 32, further comprising a guide tube having an angled tip,
20 at least a portion of said fracture pin being positioned within said guide tube.

 48. The device of claim 32, wherein said fracture pin is removably coupled to said
housing and said fracture pin is disposable.

49. The device of claim 47, wherein said angled tip may have an angle that ranges from approximately 30-60 degrees.

50. The device of claim 47, wherein said guide tube has an outside diameter that ranges from approximately 6-8 millimeters.

51. The device of claim 32, further comprising means for limiting the movement of said sharpened tip when said cylinder is actuated to thereby limit a depth of said at least one hole.

52. The device of claim 32, wherein said fracture pin is operatively coupled to said housing.

53. The device of claim 32, wherein said device further comprises a biasing member that is adapted to cause said sharpened tip to return to an initial, retracted position after said at least one hole has been formed.

54. A device for forming multiple holes in subchondral bone, comprising:
a housing;

a fracture pin having a sharpened tip, said sharpened tip adapted to penetrate subchondral bone; and

means for causing said sharpened tip to move and penetrate into said subchondral bone, thereby forming at least one of said holes.

55. The device of claim 54, wherein said means for causing said sharpened tip to move and penetrate into said subchondral bone comprises a cylinder that is adapted to, when actuated, cause said sharpened tip to move and penetrate into said subchondral bone, thereby forming at least one of said holes.

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56. The device of claim 54, wherein said means for causing said sharpened tip to move and penetrate into said subchondral bone further comprises:

a hammer that is pivotally coupled to a rod of said cylinder;

an air block that is operatively coupled to said cylinder; and

10 a trigger that is operatively coupled to said air block, wherein, when said trigger is actuated, said air block allows air to flow to said cylinder through said air block to thereby actuate said cylinder.

15 57. The device of claim 54, wherein said means for causing said sharpened tip to move and penetrate into said subchondral bone comprises a movable hammer that is adapted to, when actuated, cause said sharpened tip to move and penetrate into said subchondral bone, thereby forming at least one of said holes.

20 58. The device of claim 54, wherein said means for causing said sharpened tip to move and penetrate into said subchondral bone further comprises a cylinder coupled to said moveable hammer.

59. The device of claim 54, wherein means for causing said sharpened tip to move and penetrate into said subchondral bone further comprises:

a trigger that is operatively coupled to said hammer, said hammer being rotatably
moveable by actuation of said trigger; and
a hammer biasing spring being operatively coupled to said hammer.